

15¢

SCIENCE NEWS LETTER

DEC 13 1943
DETROIT

THE WEEKLY SUMMARY OF CURRENT SCIENCE • DECEMBER 4, 1943



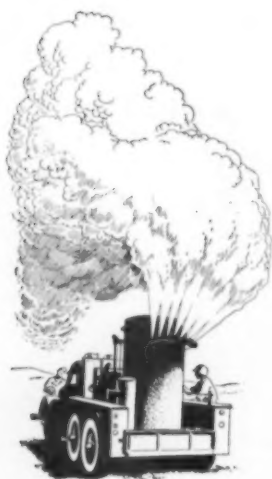
Aerographer's Penthouse

See Page 355

A SCIENCE SERVICE PUBLICATION



Foothold *in a Fog*



Smoke Generator in Action

Good weather is bad weather for an invasion. When American troops land on enemy beaches, it's often under cover of a friendly life-saving "fog."

American scientific and engineering ingenuity provided the equipment for our forces to make their own special invasion weather. For the "fog" is produced artificially by mobile smoke generators which blanket whole areas in an impenetrable white mist.

Months ago, the National Defense Research Committee enlisted the help of General Electric research scientists in developing an improved smoke generator for the Chemical Warfare Service.

Nobel prize winner Dr. Irving Langmuir

and his associates evolved a new principle of smoke generation, upon which the Standard Oil Development Company designed and built the equipment. The smoke it produces is harmless; it doesn't even soil clothes. But it does keep our troops and their movements from the sharp eyes of enemy aircraft.

This smoke generator, which according to reports has saved lives in Allied landings wherever it has been used, is another example of American industry's research and engineering and manufacturing skill. Producing superior weapons for our troops today, these same resources will be available for all the American people tomorrow in building a better world. *General Electric Company, Schenectady, New York.*

192,000 employees of General Electric are buying over a million dollars of War Bonds every week.

GENERAL  ELECTRIC

962-4928-211

Hear the General Electric radio programs: "The G-E All-girl Orchestra" Sunday 10 p.m. EWT, NBC—"The World Today" news, every weekday 6:45 p.m. EWT, CBS.

PHYSICS

From Invisible to Visible

New microscope converts ultraviolet image to a picture in full colors. The colors of the image correspond to the different ultraviolet wavelengths.

➤ A NEW FIELD of microscopic research will doubtless be opened by an ingenious new microscope which converts an invisible ultraviolet image into a visible picture in full colors.

The microscope is the invention of three Russian scientists, E. M. Brumberg, S. Gershgorin, and P. Radchenko of the State Optical Institute of Leningrad, and it is described in the issue of the British journal, *Nature* (Sept. 25), just received.

The colored image has the same advantage that the use of colors has on a map in making the various parts stand out in stronger contrast. It permits also the use of ultraviolet stains to make visible details that would otherwise be invisible, just as the biologist now uses visible stains with the ordinary microscope for the same purpose. This is of great importance not only in biology but also in micro-chemistry.

The colors of the image correspond to and are an index to the different wavelengths of the ultraviolet light used to illuminate the object. The image is thus shifted in wavelength from the ultraviolet to the visible.

Ultraviolet light has long been used in high-power microscopes because its short wavelength permits smaller details to be revealed than would be revealed by the longer waves of visible light. But the image, being invisible, had to be photographed or caught on a fluorescent screen, and gave, of course, the ordinary black and white photograph or a one-color image.

To obtain a colored picture, a sort of ultraviolet version of three color photography was devised. The object was photographed with three different wavelengths of ultraviolet light, and the three negatives were then reproduced with the aid of red, green and blue light. The combination gives all the other colors.

To obtain a directly visible image without the use of photography the images given by the three ultraviolet wavelengths were thrown on a screen covered with three fluorescent substances which respond to the three ultraviolet radiations with red, green and blue light respectively.

In a later form a white fluorescing screen was used and the colors were given by an arrangement of rotating disks and light filters.

All this would have been quite easy to accomplish but for one thing. No microscope objective existed that could take care of the large range of ultraviolet wavelengths required. Existing ultraviolet microscopes use monochromatic or one-wavelength light, for the reason that it is impossible to make a satisfactory achromatic lens for ultraviolet light.

An uncorrected lens used with visible light produces rainbow-colored fringes around the image, as can be seen when you form an image of the sun with a magnifying glass. With ultraviolet light of many wavelengths similar fringes are formed, giving a blurred image which is quite useless.

To overcome this difficulty and put the method into successful practice, a brand new microscope objective had to be devised and this was done. It is an ingenious combination of tiny concave and convex mirrors, for the mirror has no chromatic aberration. For this reason, too, the mirror has largely supplanted the lens in our great modern telescopes.

Science News Letter, December 4, 1943

PHOTOGRAPHY

Exact Location of Aerial Photographs Now Possible

➤ A NEW CAMERA makes it possible to locate aerial photographs exactly in terms of latitude and longitude. By use of zenith cameras designed for night use, aerial maps made by the Army and Navy over New Guinea, North Africa and other regions of military importance can be located within 40 or 50 feet.

Zenith cameras, developed by the Eastman Kodak Company at the request of the Army, offer an accurate shortcut to celestial navigation. Special camera outfits are placed at one or more points within the area being mapped. By coordinating the star data from the cameras with the land pictures from aerial mapping, all guesswork as to the exact

location of a mapped area is removed.

One camera photographs the portion of the sky immediately overhead; while another, connected by electrical cables, photographs three navigation watches set on Greenwich time. An automatic timing unit operates and synchronizes the two.

This new device gives all the data necessary to determine latitude and longitude exactly. A catalog of the stars makes it possible for men who know nothing about astronomy to establish the exact position of the scene.

Science News Letter, December 4, 1943

METEOROLOGY

Tree Hut Houses Marines' Aerographical Workshop

See Front Cover

➤ MARINE aerographers, who make balloon, radiosonde and other observations of the earth's upper atmospheric layers for information needed by the air forces, sometimes work in unusual places. One such scene is shown in the official U. S. Navy photograph, taken on the island of Espiritu Santo in the Pacific, reproduced on the cover of this SCIENCE NEWS LETTER. The aerographers carry on their work in the hut ingeniously built in the fork of a tropical tree.

Science News Letter, December 4, 1943



WEATHER WATCHER—A Marine aerographer is shown here working with one of his meteorological instruments on the Pacific island of Espiritu Santo.

PHYSICS

Smallest Quantum Larger

Measurements made with the help of X-rays prove that the tiniest unit of energy is somewhat greater than former measurements indicated.

► THE SMALLEST "quantum" of energy, the amount that would be emitted by a single atom making one vibration per second, if that were possible, has been somewhat enlarged by new measurements made with the help of X-rays. The measurements were carried out by the physicist, Prof. Per Ohlin of the University of Uppsala, Sweden, and are reported in the current issue of the British journal of science, *Nature*. (Sept. 18)

Previous measurements by this method gave results 0.3% to 0.4% smaller than those calculated from the atomic theory and other experimental data. The discrepancy was due, Professor Ohlin pointed out, to the difficulty of determining just where the X-ray spectrum ends on the short wave side, which is the principal observation required by this method. This is as difficult as, or more difficult than, determining precisely where the edge of a rainbow is, especially on the blue side.

A more precise way of determining this limit removed the difficulty and gave results in satisfactory agreement with those calculated from the atomic theory.

The quantity determined by this method is not directly the smallest quantum, Planck's radiation constant as it is more familiarly known to the physicist, but its ratio to the smallest electric charge,

h/e . Professor Ohlin's final result for the ratio is 1.3787 divided by 10^{17} (1 followed by 17 zeros) which is the same, within the limits of experimental error, as that derived from the atomic theory. Since the smallest charge, e , is known h is readily found.

To find the precise point where the X-ray spectrum fades to nothing, the method had been to use a narrow band of the spectrum near the end and measure its increasing intensity as the voltage was raised. A curve of these intensities was then plotted, and the curve was extrapolated downward, continued by the eye, to the level of zero intensity. This should have given the voltage at which that particular band of X-ray frequencies began to be emitted, but it didn't quite.

Professor Ohlin, by using a much narrower band and changing the voltage by very small steps (2 volts), which was made possible by the use of a more powerful and efficient X-ray apparatus, found an irregularity at the lower end of the curve quite undisclosed by the previous coarser measurements. This accounted for their failure to get a result in agreement with that derived from the atomic theory, which result is thus confirmed and may be taken to be correct together with the theory and measurements on which it is based.

Science News Letter, December 4, 1943

MEDICINE

Fast Syphilis Treatment

Two speeded methods are giving good results, report of the first year of their use at a Chicago center shows. Patients usually complete course of treatment.

► GOOD RESULTS with two of the modern fast methods of treating syphilis are being obtained at the Chicago Intensive Treatment Center, it appears from a report of the first year of the Center's operation. (*Journal, American Medical Association*, Nov. 27)

A total of 931 patients, all of whom submitted voluntarily to the treatment, were given the so-called one-day treat-

ment with fever and chemicals. Actually they are in the hospital seven days. During one of these days they spend seven hours in the fever cabinet. A single dose of bismuth is given 24 hours previously and while the patient is in the fever cabinet, three doses of an arsenical are given.

Of these 931 patients, two died. Following the second death the treatment

was modified somewhat and in the next 242 consecutive cases there were no deaths. There were relapses in 49 patients, just over one-fifth. The dosage of the arsenical drug was then increased somewhat, and in the last 488 patients there have been no deaths and only eight relapses.

Another 390 patients were given intensive chemical treatment without fever. They are given the arsenical twice daily for seven days and bismuth once every second day for four doses. They remain in the hospital for two weeks. There have been no deaths in this group. The re-

SCIENCE NEWS LETTER

Vol. 44 DECEMBER 4, 1943 No. 23

The weekly Summary of Current Science, published every Saturday by SCIENCE SERVICE, Inc., 1719 N. St., N. W., Washington 6, D. C. North 2255. Edited by WATSON DAVIS.

Subscriptions—\$5.00 a year; two years, \$8.00; 15 cents a copy. Back numbers more than six months old, if still available 25 cents.

Copyright, 1943, by Science Service, Inc. Reproduction of any portion of SCIENCE NEWS LETTER is strictly prohibited. Newspapers, magazines and other publications are invited to avail themselves of the numerous syndicate services issued by Science Service.

Entered as second class matter at the post-office at Washington, D. C., under the Act of March 3, 1879. Established in mimeographed form March 18, 1922. Title registered as trademark, U. S. and Canadian Patent Offices. Indexed in Readers' Guide to Periodical Literature, Abridged Guide, and in the Engineering Index.

The New York Museum of Science and Industry has elected SCIENCE NEWS LETTER as its official publication to be received by its members.

Member Audit Bureau of Circulation. Advertising Representatives: Howland and Howland, Inc., 393 7th Ave., N.Y.C., Pennsylvania 6-5566; and 360 N. Michigan Ave., Chicago, STate 4439.

SCIENCE SERVICE

The Institution for the Popularization of Science organized 1921 as a non-profit corporation.

Board of Trustees—Nominated by the American Association for the Advancement of Science: Henry B. Ward, University of Illinois; Edwin G. Conklin, American Philosophical Society; J. McKeen Cattell, Editor, Science. Nominated by the National Academy of Sciences: R. A. Millikan, California Institute of Technology; Harlow Shapley, Harvard College Observatory; W. H. Lewis, Wistar Institute. Nominated by the National Research Council: Ross G. Harrison, Yale University; C. G. Abbot, Secretary, Smithsonian Institution; Hugh S. Taylor, Princeton University. Nominated by the Journalistic Profession: O. W. Riegel, Washington and Lee School of Journalism; A. H. Kirchhofer, Buffalo Evening News; Neil H. Swanson, Executive Editor, Sun Papers. Nominated by the E. W. Scripps Estate: Frank R. Ford, Evansville Press; Warren S. Thompson, Miami University, Oxford, Ohio; Harry L. Smithton, Cincinnati, Ohio.

Officers—Honorary President: William E. Ritter. President: Edwin G. Conklin. Vice President and Chairman of Executive Committee: Harlow Shapley. Treasurer: O. W. Riegel. Secretary: Watson Davis.

Staff—Director: Watson Davis. Writers: Frank Thone, Jane Stafford, Marjorie Van de Water, Morton Mott-Smith, A. C. Monahan, Martha G. Morrow. Librarian: Jerome Harris. Science Clubs of America: Joseph H. Kraus, Margaret E. Patterson. Photography: Fremont Davis. Sales and Advertising: Hallie Jenkins. Business Manager: Columbus S. Barber.

lapse rate at first was about one-fourth that of the combined fever and chemical group. A number of severe reactions, however, made it necessary to modify this treatment also. The interval since has been too short to allow any conclusion about the 280 treated by the modified method.

Chief advantage of the new methods of treatment is that, with few exceptions, the patients complete the course of treatment. Under the old scheme of syphilis treatment, requiring weekly visits to doctor or clinic for 18 months, many patients failed to finish the course. They not only were not cured themselves but continued to be dangerous to others.

Gonorrhea as well as syphilis is treated at the Center, sulfathiazole, with fever treatment when necessary, being used.

The Chicago Intensive Treatment Center is operated under grants from the Federal Works Agency, the U. S. Public Health Service, the State of Illinois and the Chicago City Council. This report of its first year of operation is made by Dr. Herman N. Bundesen, president of the Chicago Board of Health; Dr. Theodore J. Bauer, U. S. Public Health Service, venereal disease control officer for Chicago; Dr. H. Worley Kendell, U. S. Public Health Service, director of the Center and one of the originators of the one-day, combined fever and chemical treatment of syphilis; and Dr. R. M. Craig, Dr. G. X. Schwemlein, E. C. Sittler, Dr. M. F. Steves, Dr. E. A. Strakosch, Dr. A. A. Rodriguez, Dr. N. D. Shaw, Dr. Jack Rodriguez, and Dr. H. C. S. Aron.

Science News Letter, December 4, 1943

CONSERVATION

Shortages Cause Research

Lack of sufficient fuel in Great Britain has brought about an intensive conservation program. Gasoline manufacture from coal is increasing.

► **FUEL SHORTAGES** in Great Britain, in wood, coal, oil and gasoline, are directly responsible for an intensive fuel conservation program put into operation early in the war, and also for the establishment of scientific research projects covering both the conservation of fuel and the development of special fuels from English coal. These measures were discussed at the meeting of the American Society of Mechanical Engineers in New York City by W. C. Schroeder of the U. S. Bureau of Mines.

Conservation is being carried out through education and rationing, he stated. The gasoline rationing that the American public endures is mild compared with that in Great Britain. All pleasure driving is banned. Gasoline can be obtained only to go to work in essential industries and where no public transportation is available. Industrial users of coal are cut by nearly 8% of their normal amounts. Home owners are expected to maintain in their houses a temperature not over 60 degrees, and to avoid all waste of heat, water and electricity.

Research projects are those of immediate importance that can be solved quickly, he said. They include the development of producer-gas from coal to propel automobiles, trucks and buses; an efficient mixture of powdered coal

and oil for factory furnaces, and the conversion of coal to oil and gasoline.

Because of the lack of forests, wood or charcoal cannot be used extensively in England for producer-gas as they are in Germany and other countries. Anthracite and high-temperature coke are now yielding a satisfactory gas in Great Britain as a result of recent research. The coke-gas has greater activity when sprayed before using with a sodium carbonate solution.

Colloidal oil, made of a mixture of coal and oil, has been in use in England since World War I, but is more widely used now, perhaps because of better mixtures resulting from recent research. Experimentation in the conversion of coal to oil and gasoline did not start in England as early as in Germany, where research work started in 1913. About 1930, an English chemical company became interested, constructed a plant, and has been in commercial operation since 1935.

"Governmental and scientific circles in Great Britain are now fully awakened to the importance of these processes for making liquid fuels from coal," Mr. Schroeder declared. "It is to be hoped that this same realization of the potentialities inherent in these developments will arise in the United States."

Science News Letter, December 4, 1943

PUBLIC HEALTH

Directional Finder Shows Where Mosquitoes Breed

► A **DIRECTIONAL** finder for mosquito flights that can help locate where these possible disease carriers are breeding was reported by Lt. (jg) William M. Gordon, USNR, and 2nd Lt. Eugene J. Gerberg, U. S. Army, formerly assistant entomologist with the U. S. Public Health Service, to the National Malaria Society meeting in Cincinnati.

It consists of a mosquito barrier trap, made of four wire screens coated with Tree Tanglefoot, a non-drying varnish, and looks something like a weather vane. The screens are mounted at 90 degree angles to each other, giving two screen surfaces facing each wind direction and forming a barrier plane.

"If mosquitoes were taken only on the southeast side of the southwest screen and on the southwest side of the southeast screen," it was explained, "the mosquitoes must have come from a true south direction. If the prevailing winds happened to have been from the north, we could assume that mosquitoes were breeding south of the trap and were blowing the wind."

The trap does not necessarily serve as a weather vane but instead indicates flight direction, regardless of prevailing winds. Comparative tests showed these traps are as effective as electric mosquito traps.

Science News Letter, December 4, 1943

NUTRITION

New Link For Diet and Disease Resistance Found

► A **NEW** link between diet and resistance to infection appears in studies reported by Dr. C. A. Mills and Dr. Esther Cottingham, of the University of Cincinnati College of Medicine, at the meeting of the American Society of Tropical Medicine in Cincinnati.

When mice, rats and guinea pigs were starved of vitamins to the point where they failed to grow properly, the activity of their phagocyte cells was likewise reduced, these scientists found. Phagocyte cells play an important part in fighting off infection because of their ability to gobble up disease germs.

The reduction in phagocytic activity was found when the animals were on diets deficient in the following vitamins: thiamin, or B₁; riboflavin, pyridoxine, pantothenic acid and choline, also members of the vitamin B family; and vita-

min C. Two other B vitamins, inositol and para-aminobenzoic acid, were without effect but lack of vitamins A and D combined seemed to reduce the phagocytic activity.

A relation between diet, particularly its vitamin content, and resistance to infection has long been suspected. The Cincinnati investigators point out that past evidence shows this is not a matter of vitamin deficiency affecting directly the resistance given by another class of

the body's germ-fighters, the antibodies. These substances are more specific in their germ-fighting activity than the phagocytes and are responsible for the kind of disease resistance obtained from vaccines.

The discovery of reduced phagocyte activity resulting from vitamin deficiency may, the doctors suggested, give a valuable means for detecting slight degrees of vitamin starvation.

Science News Letter, December 4, 1943

NUTRITION

Soldiers Need Vitamin C

➤ **SOLDIERS** preparing for battle or actually in combat need plenty of vitamin C to help them withstand the shock of any injuries they may receive, if results of laboratory studies on guinea pigs can be transferred to man, Dr. A. Wilbur Duryee, of New York Post-Graduate Medical School, Columbia University, reported at the meeting of the American Therapeutic Society.

Guinea pigs on a diet lacking vitamin C, the citrus fruit-tomato vitamin that prevents scurvy, succumbed more readily to shock from injury than animals getting plenty of the vitamin, he and his associates, Miss Ellen McDevitt and Dr. Bertrand E. Lowenstein, found.

Giving the animals doses of vitamin C immediately after injury did not pre-

vent their dying from shock, but those already getting plenty of vitamin C in their diet were helped by the extra vitamin dosage after the injury to survive four times as long, even though they eventually succumbed, as the vitamin-starved animals similarly treated.

Guinea pigs on diets furnishing plenty of vitamin C, the Columbia scientists also found, become considerably more resistant to injury when repeated every other day. Vitamin C-starved guinea pigs, on the other hand, cannot be conditioned to injury in that way.

Vitamin C, the scientists suggest as a result of their studies, might well be added to blood plasma at the time this is given to treat shock.

Science News Letter, December 4, 1943

MEDICINE

Aluminum for Silicosis

Treatment, pioneered by Canadian scientists, helped keep a miner from having to stop working. His improvement is due largely to psychological effect.

➤ **THE STORY** of how aluminum treatment for silicosis, pioneered by Canadian scientists, helped to keep a shift boss in an American mine from having to quit work and lose his chances of promotion was told in a report by Dr. L. U. Gardner and Dr. George Wright, of the Saranac, N.Y., Laboratory at the meeting of the Industrial Hygiene Foundation in Pittsburgh.

This 35-year-old miner suffered from a progressive type of silicosis due, the scientists believe, to excessive exposure in early life. He also seemed to be one of those persons unusually prone to develop silicosis because of poor upper respiratory protection.

For over a year he was concerned over his shortness of breath. He could not, because of the distance, go to the field laboratory where other miners were inhaling metallic aluminum powder for silicosis, prescribed by the Porcupine Clinic in Canada, so he was given a small quantity of powdered alpha monohydrate of aluminum which he inhaled from a simple apparatus consisting of two bottles, an atomizer bulb and a valved mouthpiece.

This seemed to help him as much as the metallic aluminum powder was helping the other miners. Tests after 50 daily treatments, and again after about 50 more, however, showed no essential dif-

ference in his performances at rest and during exercise.

The fact that he felt so much better is due, the scientists believe, to psychological effect. His actual disability has not been decreased materially, but the exaggeration of it by his worry has been overcome. The treatment will be continued not only because of this psychological help but, more important, because the treatment should keep his silicosis from getting worse.

This checking of the disease, in the opinion of Dr. Gardner and Dr. Wright, is the most important use for aluminum treatment.

"We feel certain that it will prevent the development of silicosis and even cause retrogression of incipient disease," they stated. "It has a real place in protecting persons like this man who face ultimate permanent disability whether they quit their jobs or continue to work where they are best qualified. His mine is under good industrial hygienic control but there is still some silica in the air. 'Susceptible' as he apparently is, added exposure may hasten his total incapacitation. Aluminum should neutralize any quartz that he inhales in the future and hold his disease at its present level."

Science News Letter, December 4, 1943

ENGINEERING

Mirrors Make Industry Safer, Products More Perfect

➤ **"IT'S DONE** with mirrors," explains the latest electronic magic which promises to make many industrial jobs safer, products more efficiently inspected.

The new device, called a "wide-angle photo-electric scanner" by its inventor, E. B. McDowell of General Electric's electronic division, was demonstrated to science writers at a press conference on industrial electronics in Schenectady.

Advantages over present methods claimed for the scanner are: 1. simpler, 2. more compact, 3. more efficient. Here is how the laboratory model worked:

A four-sided area is lighted along two sides by ordinary light. On a third side whirls a four-faced pyramid of mirrors a few inches high. This picks up the light blanketing the area, and reflects it to an adjacent light-sensitive cell which is essentially an electronic emission tube.

Should an object as small as a man's finger enter the lighted area for even a two-hundredth of a second, the electronic eye will detect its fleeting shadow. Thus its application as an industrial safety

device. If the blanket of light were hung across a punch press, for example, a man's finger entering the danger zone would instantly activate the electronic shut-off switch for the machinery.

Used as an inspection device, the light could be reflected from speeding sheets of paper during manufacture; imperfections would be detected by the scanner since blotches on the paper would cause slight changes in light intensity. This untiring "eye" could similarly be adapted to other products requiring inspection of a large expanse.

Need for a more efficient automatic door opener mothered the new inven-

tion, which stems from the old idea of light scanning with mirrors.

Photoelectric methods now installed to open doors usually have several cells, instead of one, and use broad beams of light. When a truck with protruding pipes or lumber backs to the unloading door, the door may fail to open in time because only a small part of the beam is cut off by the thin projections.

This "maybe factor" is avoided by the new scanner since only a small segment of light registers at a time but the entire lighted area is checked in a fraction of a second.

Science News Letter, December 4, 1943

ENGINEERING

Most Electrical Ship

New battleship Iowa, largest of world's warcraft, can pour out 10,500 kilowatts of electrical energy from her generators, enough to supply a city.

► THE NEW battleship Iowa, hugest among the world's warships, also has the most elaborate electrical installation. Capt. H. G. Rickover, USN, sketched some of the high points of her equipment in an address before a meeting of the American Institute of Electrical Engineers in Roanoke, Va.

The generators aboard the Iowa can pour out a total of 10,500 kilowatts of electrical energy, which is enough to supply a city of 20,000 people. The huge ship carries 1,300,000 feet of electric cable, 900 motors, 5,300 lighting fixtures, 275 service telephones and 800 battle telephones.

Impressive though these figures are, they only serve as typical for the U. S. Navy in general. American ships are electrical ships, and have become increasingly so since the first World War. Then, Capt. Rickover pointed out, the over-all figure for generating capacity in the Navy as a whole was about one-twentieth of a kilowatt per ton of displacement; now it is approximately one-fourth of a kilowatt.

Some of the special problems involved in electrical installations on Navy ships were pointed out by the speaker:

"In addition to the characteristics normally required in electrical equipment for industrial use, it is necessary that certain special features be incorporated in the design for naval application. These special features include reliability, ruggedness, use of corrosion-proof materials, drip-proof and water-tight

features, ability to withstand the roll and pitch of vessels, and insulation and impregnation adequate to prevent failure due to the effects of moisture and salty sea water. It is highly important that disassembly, repairs, and re-assembly of the equipment be easily and quickly accomplished on the vessel with ordinary tools and readily obtainable parts.

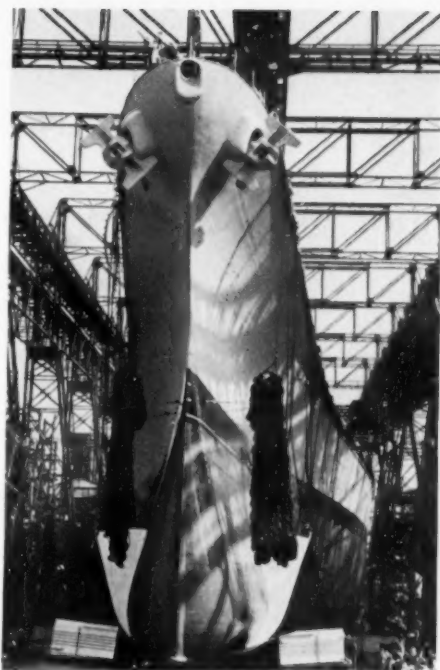
"The vast shipbuilding program now in progress has introduced many problems requiring prompt action and solution to avoid delay in ship construction. In order to meet the tremendous demand for electrical equipment entire new plants have been constructed. One factory produces nothing but 6000 horsepower synchronous motors and one motor per day is completed in this plant. Another similar factory produces one 4600 kilowatt steam turbine condenser and generator per day. These generators supply the power for driving the 6000 horsepower motors."

Science News Letter, December 4, 1943

ENGINEERING

New Standards for Fiber Insulating Board Issued

► NEW FIBER insulating board standards have just been released by the National Bureau of Standards. They include classes of structural materials designated as building board, lath for plaster base, roof insulating board, interior board and sheathing. The publication is a revision of the 1935 standards.



GIANT OF THE SEAS—The massive 45,000-ton USS Iowa, mightiest man-o'-war ever launched, is shown in this official U. S. Navy photograph sliding down the ways of the New York Navy Yard.

The new standards cover minimum physical requirements and tests for thermal conductivity, transverse and tensile strength, linear expansion, deflection and water absorption. They cover also requirements for composition, construction and finish.

Science News Letter, December 4, 1943

CERAMICS

Glass-Mending Method Uses Refractory Paste

► BREAKING of a precious Venetian vase or Bohemian bottle is a domestic tragedy at any time, and much worse now that their sources are for the time completely cut off. This gives interest to a process for glass mending on which A. M. Landesman and Eugene Landesman of St. Louis have been granted patent No. 2,333,186. In mending a broken glass vessel, first the fragments are carefully set back in place, then the whole thing is embedded in a coating of refractory paste and placed in a small furnace. When the right temperature has been reached, a blowpipe raises the glass along the fracture lines to the melting-point, which causes the broken parts to fuse together.

Science News Letter, December 4, 1943

AGRICULTURE

Heavy Rains Don't Warrant Diminished Crop Output

► **CROP LOSSES** due to heavy rains soaking poorly drained farm areas represent an unnecessary loss to the nation's potential food supply, John G. Sutton of the U. S. Soil Conservation Service states in a report to the American Society of Agricultural Engineers.

With proper drainage to prevent crop drowning, Mr. Sutton estimates that production output of at least 6,500,000 acres of land now being farmed could be substantially boosted.

A U. S. Soil Conservation Service survey of "before and after" yields of farms which have recently benefited from construction of drainage facilities reveals that the average "bonus" attained in terms of extra bushels produced per acre is as follows: corn, 18; wheat, 5; grain sorghum, 20; rice, 18; potatoes, 39; soybeans, 9.

Drainage projects now in use are in many cases not functioning to best advantage. Of the 87,000,000 acres in organized drainage projects, the Soil Conservation Service estimates that almost 25 million acres are in need of rehabilitation. Cost of this land improvement is small in relation to the benefits, as reported by Mr. Sutton. Based on experience with large scale operations, he estimates that at least 80% of the rehabilitation of open ditch work could be reconstructed at a cost of less than \$10 per acre.

Science News Letter, December 4, 1943

NUTRITION

Soybean Curd Makes Good Cottage Cheese Substitute

► **NOW THAT** cottage cheese production has been curtailed, soybean curd can be used as a good substitute. Soybean milk, made from dry soybeans, is caused to form a curd which can be used in many dishes. It may be added like cheese to omelets, Welsh rabbit and creamed hard-boiled eggs, or served with other vegetables in hot dishes. Its mild, somewhat cheese-like flavor and soft texture makes its use as a stuffing for celery, pepper rings, or raw tomatoes desirable. It is good as a garnish on salads or mixed with salad dressing. It can be rolled into balls and served with crisp lettuce.

To make the soybean milk from which the curd is produced, soak the cleaned beans overnight. Remove the skins and

grind the beans very fine, then put them in a cheesecloth bag. Place the bag in a bowl containing three quarts of lukewarm water to each pound of soybeans. Work the ground beans thoroughly with the hands for five or 10 minutes, then wring the bag of pulp until dry. Boil the milk on a low fire for 30 minutes, stirring frequently to prevent scorching. Season the milk with salt and sugar.

From this milk, which itself can be used in almost any recipe calling for milk, is made the soybean curd. Three quarts of soybean milk heated to 180 degrees Fahrenheit is mixed well with 1½ cups of vinegar and allowed to stand for a few minutes. Put the mixture in a cheesecloth bag and wash away the excess acid by dipping the bag of curd in cold water several times. Drain for about an hour and press out the remaining liquid. Season with salt and pack the curd tightly into a dampened mold. Then cover and store it in a cold place until firm enough to cut.

Though the nutrient value of soybean curd is not equal to that of cottage cheese, it produces an appetizing substitute.

Science News Letter, December 4, 1943

OPTICS

Eye Muscles' Double Role Causes Visual Illusion

► **MAYBE** it has happened to you at the movies while President Roosevelt is making a speech in one of the newsreels. You may glance momentarily from the President to one of the men on his left and when you swing your eyes back immediately to the speaker, you find him to be quite still, with his mouth open or closed, while his voice goes on.

This impression lasts only a fraction of a second, but what has happened is that you're the victim of a visual illusion. In a report to the British journal, *Nature* (April 10, Sept. 18), F. W. Eldridge-Green, special examiner and adviser of the British Ministry of War Transport on vision and color vision, explains this illusion by his theory that the muscles of the eye play a double role, or function, one to move the eye and the other by pressing on the back of the eye and shifting the photochemical film in the direction in which the eye is moved.

The eye on moving takes a fresh photograph, he explains, which is seen for an appreciable length of time before another complete "picture" can be seen.

Science News Letter, December 4, 1943

IN SCIENCE

ARCHITECTURE

Future Homes May Have Colorful Wiring Systems

► **BEAUTY** will be more than skin deep in the home of tomorrow. Plumbing and wiring systems—the veins and nerves of the building—will be transformed into streamlined colorful affairs, visible through transparent and translucent plastic walls, Alden B. Dow, architect, has predicted in a report to the Society of the Plastics Industry.

Light reflected from the brightly colored translucent walls and roofs will make the home resemble a giant glowing lantern in the night, Mr. Dow declared.

Variety will be the keynote in the decorative effect. The plastic walls may confine a chemical solution that remains perfectly clear above a temperature of about 60 degrees Fahrenheit. Below that temperature, the chemical should crystallize into a beautiful pattern, giving an opaque wall-paper effect. When the temperature rises again, this chemical, Mr. Dow hopes can be found, would return into solution, once more clear and colorful.

It's all still a dream, Mr. Dow admits.

Science News Letter, December 4, 1943

MEDICINE

Society Awards Medal To Human "Guinea Pig"

► **THE SCIENTIST** who spent a week in a glass case to test the effects of insufficient oxygen has been awarded the Copley Medal of the Royal Society of London, a medal originating in 1709. The left arm of Sir Joseph Barcroft is pulseless and has a long scar due to its being cut open to test his blood after the experiment.

The Society's historic Davy Medal was granted to Prof. Ian M. Heilbron for his notable contributions to the knowledge of organic chemistry. Professor at the Imperial College of Science and Technology since 1938, he has done important research on the purification and chemistry of penicillin, the germ-killing drug derived from mold.

Royal medals were awarded to Sir Harold Spencer Jones, royal astronomer, and Dr. E. B. Bailey, geologist.

Science News Letter, December 4, 1943

CE FIELDS

CHEMISTRY

Synthetics May Replace Scarce Porpoise Jaw Oil

► SCARCE porpoise jaw oil, superior to other fish liver oils or to any oil derived from petroleum for the lubrication of telephone dials or other light instruments that must operate for a long time without attention, may be replaced by new synthetics recently developed.

This welcome news was announced by Dr. S. Bloomenthal, of the Automatic Electric Laboratories of Chicago, in a paper presented to the American Physical Society meeting in Evanston.

The long-lasting qualities of porpoise jaw oil, the speaker said, were probably due to its exceedingly low volatility, by virtue of which the tenacious films it forms on metal surfaces take a long time to evaporate. The new synthetics, of complicated chemical formulas, also have extremely low volatility, and remain liquid at 30 degrees below zero.

Aid in the research was had from the Laboratory of the Distillation Products Company of Rochester, N. Y., which also puts out a low volatility synthetic oil. All of these oils gave far better results in the lubrication of telephone dials than light petroleum or fish liver oils, Dr. Bloomenthal said, and he believed that a satisfactory substitute for porpoise jaw oil has been found.

Science News Letter, December 4, 1943

ASTRONOMY

Astronomy Prize Awarded To Woman Star Classifier

► THE COUNCIL of the American Astronomical Society has awarded the Annie J. Cannon prize for women astronomers to Miss Antonia C. Maury of Hastings, N. Y., for her distinguished work at the Harvard College Observatory in the early days of spectral classification.

Miss Maury at the turn of the century devised her own system of classifying the spectra of the stars on the basis of detailed descriptions of their characteristics as obtained from high dispersed spectra. These details have since been shown to have great significance in revealing the physical characteristics of the stars.

The present chief means by which astronomers identify the super giants among the stars is by the extreme sharpness of the lines in their spectra. This so-called "C" characteristic was discovered by Miss Maury.

The award itself is named for another Harvard woman spectroscopist, the late Dr. Annie J. Cannon, who classified the spectra of some 500,000 stars for the *Henry Draper Catalogue*.

The American Astronomical Society has elected Sir Harold Spencer Jones, astronomer royal of England, to an honorary membership. Such memberships are granted to distinguished foreign astronomers. Sir Harold is known for his recent redetermination of the distance of the sun as being very close to an even 93,000,000 miles. His work was based on world-wide observations of the close approach of the minor planet Eros in 1931.

Science News Letter, December 4, 1943

OPTICS

Optical Device Invented To Aid Football Linesmen

► IF IN FUTURE football games you see the head linesman peering along the line of scrimmage through what looks like a short telescope mounted on a pistol-grip handle, that will be the invention on which Mirabeau B. Lamar of Manassas, Va., has received patent No. 2,335,066. It sights very accurately on the position of the ball, and at the same time a pair of mirrors at angles throw into the picture the images of the line stakes. With this device, if adopted, it should be possible to decide in close cases whether or not a first down has been made, without having to trot the line out and measure it quite so often.

Science News Letter, December 4, 1943

HORTICULTURE

Apple Tree Is Patented That Matures Fruit Early

► PLANT PATENTS continue to be issued rather sparingly—only three in a recent week as compared with 535 ordinary patents. One of these, taken out by Robert Campbell of Grand Forks, B. C., is on an apple tree. It matures its round, glossy, red-skinned fruit very early—in August, in British Columbia. A particular feature is the tree's branching habit: the originator states that the limbs tend to come out at right angles to the trunk, making a very desirable tree for orchard-management purposes.

Science News Letter, December 4, 1943

MEDICINE

Sulfadiazine Helps Bronchiectasis Patients

► SULFADIAZINE, or possibly other sulfa drugs, may prove a valuable aid in the treatment of bronchiectasis, it appears from a report by Dr. Charles M. Norris, of the Chevalier Jackson Bronchoscopic Clinic, Temple University Hospital, Philadelphia. (*Journal, American Medical Association*, Nov. 13)

In ten patients given the sulfa drug by mouth and bronchoscopic aspirations, the daily volume of sputum was considerably reduced and the more harmful germs inhabiting their bronchi were apparently routed, since sputum examinations showed less harmful varieties after the treatment than before.

The patient must spend a week or ten days in the hospital while undergoing treatment. It should, in Dr. Norris' opinion, prove definitely valuable as a preliminary to operation for removal of one or more lobes of the lung, and is worth trying for possible beneficial effects in cases not suitable for operation.

Science News Letter, December 4, 1943

ENGINEERING

Post-War Auto Engines Will Use High Octane Gas

► THE POST-WAR automobile will run with high octane gasoline and incorporate many features of aircraft engine design, it was predicted at the meeting of the American Petroleum Institute in Chicago.

A survey of five years of intensive research to produce a high octane gas suitable for aircraft engines was presented by C. L. Thomas, N. K. Anderson, H. A. Becker and J. McAfee, of Universal Oil Products Co., Chicago. In this process, the heavy molecules of raw oil are broken down, or cracked, with the aid of a synthetic catalyst, a highly porous white granular solid, silica-alumina.

Small refiners, as well as the big ones now using this process, will be able to use it in the future, the engineers forecast.

Equipment of the catalytic process of producing aviation type gasoline is at present too expensive for the small refiner, the speakers admitted, but many large commercial installations are the proving grounds for making this process economically feasible for all in the future.

Science News Letter, December 4, 1943

MEDICINE

More Penicillin Coming

Distillers, mushroom and molasses firms all join in the increasing production of the germ-killing mold. Present production figures are a secret.

By JANE STAFFORD

► MORE PENICILLIN, germ-killing chemical from mold, is on the way. Distillers, mushroom and molasses firms have joined the ranks of drug manufacturers, and all of them are rapidly swinging into large-scale production of this life-saving medicine which a bacteriologist discovered in a mold that was spoiling some of his experiments.

Actual production figures are a secret. The armed services get first call on all the penicillin that manufacturers can turn out, and the Army is said to be demanding 10 times as much penicillin for 1944 as it got in 1943. Nevertheless, one of the manufacturers, Dr. Theodore G. Klumpp, president of the Winthrop Chemical Company, predicts that within the next 12 months enough penicillin will be produced "to more nearly provide for civilian as well as military needs."

Prof. Alexander Fleming, a British

bacteriologist, discovered penicillin, but it was a team of scientists in the U. S. Department of Agriculture who solved the bottleneck in penicillin production. Housewives fighting to keep food from getting moldy in warm, damp weather may wonder how there could be a bottleneck in producing anything that seems to grow so fast. The answer is that the problem is not only one of growing tremendous quantities of the mold, but of growing it in such a way that it will produce large amounts of the germ-fighting chemical, penicillin. It must also be grown in pure culture, free from other molds, bacteria or the like. This makes it necessary to grow it in small units, carefully protected from other organisms, which is hard to do in large-scale commercial practice.

The discovery that the mold, *Penicillium notatum*, produced a chemical of some kind which can destroy certain disease germs was made by Professor Fleming in 1929. Little was heard about

penicillin from then until 1940 and 1941 when Prof. H. W. Florey and associates at Oxford University announced to the medical world the curative possibilities of penicillin. England, however, was in the middle of the blitz and no British chemical firm was able at that time to take on large-scale production of penicillin.

Professor Florey and Dr. N. G. Heatley, therefore, came to the United States, in the summer of 1941, to consult American chemical and drug manufacturing houses. The manufacturers were not very encouraging, but scientists at the National Research Council referred the British scientists to the Department of Agriculture, and particularly to its Northern Regional Research Laboratory at Peoria, Ill.

Has Large Mold Collection

This laboratory has one of the largest collections of molds in the world and its staff has had wide experience in the use of molds in the fermentation field. Most persons know that the fermentation which produces vinegar is done by bacteria. Less well known is the fact that certain molds also are fermenters, producing such substances as citric acid, gluconic acid, oxalic acid and sake, or rice wine. Department of Agriculture scientists were pioneers in this field. Without their knowledge, experience and facilities, it would not have been possible to develop penicillin production on a commercial scale.

The first thing these scientists did was to work out better methods of feeding and growing the mold. Then they developed new strains of mold which were more efficient penicillin producers. The result of this was to increase the penicillin yield one hundredfold.

In the early days of penicillin production, the mold was grown in large glass bottles on the surface of the nourishing medium. It is still being grown that way in some plants. Department of Agriculture scientists, however, showed that *Penicillium*, the mold, could also be grown in submerged cultures and that penicillin could be produced by the fermentation process.

This brought the whisky distillers and the mushroom and molasses firms into the field of penicillin production. Mushroom cultures, it may surprise you to



HELPING TO PRODUCE PENICILLIN—Extensive studies conducted with the vast mold collection, part of which is shown here, in the Northern Regional Research Laboratory of the U. S. Department of Agriculture, have aided the mass production of penicillin.

know, are produced by a fermentation method. Some of the drug and chemical manufacturers are now also using the fermentation process for producing penicillin, among them Merck, Squibb and Pfizer.

The fermentation processes, W. J. McManus, chief of the drugs and penicillin unit of the War Production Board, points out, give a much lower yield of penicillin per ounce, but this is more than made up for by the mass production and speed. Instead of having to wait eight to ten days for the mold to be ready for harvesting, the cycle is now four days. Instead of working with half-pint amounts and yields in the range of about 30,000 units of penicillin the fermentation process producers work on a scale of 10,000-gallon quantities and yields of 300,000 units are handled.

Further speed-up in penicillin production is expected by a new high vacuum diffusion process for drying it. The chemical is very unstable in liquid form. Steam ejectors, mechanical pumps and a freezing method utilizing a cold trap have heretofore been used on a limited scale in vacuum dehydration.

Many difficulties have been encountered, however, and the drying process has required from 20 to 40 hours. A new method, which preliminary tests suggest will reduce this time to six hours, has been announced by the National Research Corporation of Boston. Besides the saving in time, the method is said to be capable of cutting the cost of dehydration to one-sixth that of any conventional method.

After the mold has been grown and harvested, the penicillin extracted and dried, the fluffy yellow or brown powder must be assayed for potency. The Department of Agriculture scientists gave valuable assistance here, too, working out and improving methods of assay and carrying on in the Peoria laboratory all assays of commercial products until the Food, Drug and Cosmetic Administration could set up facilities for doing this.

First Step

First step toward a synthetic penicillin that might be produced on a large scale from chemicals, as sulfa drugs are manufactured, has been taken with the isolation of penicillin in pure crystalline form. Before manufacture of a synthetic penicillin will be possible, however, scientists must learn its exact chemical composition and then find methods of making the chemical on a commercial scale.

At a guess, and an optimistic one at

that, this will take at least a year and a half, as Mr. McManus sees it, and he is in a position to see all there is on penicillin production. Commercial manufacture of a synthetic penicillin, even when scientists find how to do it, may be too expensive to be practical.

Penicillin for civilians may be slightly more readily available as a result of kitchen stove and hospital laboratory methods of production developed by Dr. George H. Robinson and Dr. James E. Wallace, of Pittsburgh, and Dr. Julius A.

Vogel, of Jones and Laughlin Steel Corporation. (See SNL, Oct. 23)

Drs. Robinson and Wallace first suggested that small amounts of crude penicillin, suitable for treating wounds, sinus infections, boils and other infections of the skin and mucous membranes, could be obtained by growing the mold directly on gauze dressings which had been saturated with a solution of yeast, sugar, starch and glycerin. After saturation with this mold-food solution, the gauze is sterilized, inoculated



The Bausch & Lomb Honorary Award is made annually to boys and girls who show unusual proficiency in science subjects. Inaugurated in 1932, it has been accepted by preparatory and high schools as an inspiration to these young people to encourage their scientific endeavors.



A War to Win... A Life to Live



Johnny Davis, sitting at the desk in his room... dreaming... is not just one boy. He is one of the many who hold in their hands a bronze medal—the Bausch & Lomb Honorary Science Award—and dream of the future.

These days are difficult for lads like Johnny Davis. Today... High School Graduation Day... marks the end of his carefree world.

Tomorrow Johnny and a host of fellows like him will take up arms for their country. Some haven't thought much about the future they'll come back to. But Johnny's mind is made up. Johnny is

going to be a scientist... a great scientist... and time out for a year or two to win a war won't stop him.

In times such as these the Bausch & Lomb Honorary Science Award takes on a new meaning. It becomes a tangible link to the future for those who today have a job to do for their country.

BAUSCH & LOMB
OPTICAL CO. ROCHESTER, N. Y.

ESTABLISHED 1853

AN AMERICAN SCIENTIFIC INSTITUTION PRODUCING OPTICAL GLASS AND INSTRUMENTS FOR MILITARY USE, EDUCATION, RESEARCH, INDUSTRY AND EYESIGHT CORRECTION

with the mold and subsequently used for dressings on infected wounds.

Dr. Vogel adapted this method to one which could be carried out in the average home by anyone having only a rudimentary knowledge of sterile procedure. The bake oven of the kitchen stove, a glass coffee pot, and a tea cup are among the familiar pieces of equipment used in this process. (See SNL, Nov. 27)

Disadvantages of the method are: 1. The penicillin gauze can be used only between the ages of four and 12 days, the period during which the mold on the gauze is actively producing penicillin. The penicillin is in the crude state and is present in such small quantity that it cannot be refined and used intravenously for septicemia (blood poisoning) or pneumonia or for any infection that is not in or near the surface of the skin.

MEDICINE

\$5 Penicillin Factory

Physician who reported a new method for producing the valuable germ-fighter tells the story of how and why he started his own private mold culture.

► WITH AN INITIAL outlay of less than \$5 and at a production cost of less than five cents per petrie dishful, any doctor can manufacture penicillin, the germ-fighter from mold which money cannot buy.

These production cost figures come from Dr. Julius A. Vogel, of Aliquippa, Pa., who adapted for a kitchen production line (See SNL, Nov. 27) the method of producing crude penicillin on gauze dressings devised by Dr. George H. Robinson and Dr. James E. Wallace, of the Allegheny General Hospital, Pittsburgh. (See SNL, Oct. 23)

As soon as he read their report in a scientific publication, Dr. Vogel related at the Industrial Hygiene Foundation conference, the idea of growing his own penicillin intrigued him greatly. His evenings were free and producing penicillin at home promised both diversion and, if successful, the reward of having the precious medicine for his practice.

Remembering that he had saved from medical school days his platinum loop holder, an instrument used by bacteriologists for handling microorganisms of all kinds, Dr. Vogel first sought for and found it.

Next he telephoned Dr. Robinson who "very graciously consented" to pre-

Syphilis, gonorrhea, pneumonia, staphylococcus infections such as acute and chronic osteomyelitis, cellulitis, carbuncles of the lip and face, empyema, infected wounds and burns, pneumonia and hemolytic streptococcus infections are all vulnerable to attack by the potent mold chemical which 19 drug, chemical and other manufacturing firms are now producing as speedily and in as large quantities as possible.

Penicillin is still a new word; the pronunciation which seems to be most prevalent places the accent on the penult (next to the last syllable). This would be the natural thing to do, in deriving the word from the generic name of the mold which is its source, *Penicillium*. A good rule-of-thumb, memory aid is to say it as a lisping child might try to say "penny-shilling"—"penny-sillin'."

Science News Letter, December 4, 1943

sent him with a pure culture of his strain of the mold, *Penicillium notatum*.

"Without pausing to catch my breath, I immediately arranged to be relieved of my duties the next day," Dr. Vogel related. "Accordingly at 10:45 on the morning of the 12th (of October, four days after publication of the Robinson-Wallace report) I had safely tucked away in my vest pocket my culture of *Penicillium* which Dr. Robinson himself implanted upon the medium.

"With my precious cargo carefully protected, I secured from a surgical supply house five 75-millimeter petrie dishes, a length of platinum wire and a glass marking pencil. From my drug-gist I secured the ingredients for preparing the nutrient medium.

"On the evening of the 13th, with the mold grown sufficiently to be discernible on the surface of the medium in my test tube, I inoculated the petrie dishes and sat down to wait results. By the morning of the 18th the cultures were sufficiently mature to take them along with me and look for trouble—and in a plant employing 10,000 men it does not take long for trouble to appear. Thus was I embarked upon the course in which 'deep (Turn to next page.)

Do You Know?

Mahogany, formerly used in fine furniture, is now used to build light, speedy submarine chasers.

Most *animals* living in the wild are vegetarians, the bulk of their food being plants, seeds, fruits and berries.

Sweet potato meal may be used as a substitute for corn in cattle feeding; it is made from dehydrated *sweet potatoes*.

The *jerboa*, which looks and leaps like an eight-inch kangaroo, has excited the interest of American soldiers in North Africa.

The basking shark and the whale shark are the two biggest *fishes*; they are dull, sluggish monsters sometimes 50 feet in length.

Fighting *frigates* being built by the Maritime Commission are 306-foot boats for convoy escort duty; over 100 are under construction or already completed and in service.

Clothing after the war may be treated with a chemical now used by the Army to make it resist water, stains and spots; the chemical impregnates each fiber and is not lost in washing.

The American *soybean* crop this year will yield approximately 209,000,000 bushels, most of which, because of its high nutrient value, will go into human and stock food.

Boron was once thought by agricultural chemists to be a plant poison; now it is known that it must be present in soil in small quantities if plants are to grow properly.

The 1943-44 *wheat* crop in Australia, which will be harvested around New Year, is estimated at 89,000,000 bushels; this is 57% of last year's yield, and about 55% of the average yield for the past ten years.

Nearly \$100,000,000 worth of *gold* has been produced annually in recent years in Latin America, the greatest quantities coming from Mexico, Colombia, Chile, Peru, Brazil, Venezuela, Ecuador and Bolivia.

From Page 364

leads to depth and depth to further depth."

"Here I was, using penicillin which I myself had prepared without the facilities of a modern fully equipped laboratory at my disposal. The only

apparatus I had used was the usual equipment found in the average family kitchen of today."

Within the first three weeks he used it on 29 patients. In a few the results were disappointing, he reports, but many improved with "incredible" rapidity.

Science News Letter, December 4, 1943

EVOLUTION—SOCIOLOGY

Civilization Mutations

Leading biologist, in new book, sees revolutionary changes in progress, but warns against trying to hasten the process too violently.

► **RECOGNITION** that the world is undergoing great and rapid changes, with a warning against attempting to hasten the process violently, is one of the conclusions presented by Dr. Edwin Grant Conklin, well-known biologist, in a new book, *Man: Real and Ideal*, just published by Scribner's. Dr. Conklin, who has been president of Science Service since 1937, is professor emeritus of zoology at Princeton University and president of the American Philosophical Society.

"Society is in the throes of revolutionary changes which are inspired by the desire to shatter things to bits and then remould them nearer to the heart's desire. But if such desires are not wise and just they produce ruin rather than progress. This shattering of things to bits in order to remould them nearer to the heart's desire is the method of revolution rather than that of evolution, of tyranny and compulsion rather than of freedom and education, of autocracy rather than of democracy.

"All development builds on what has gone before, and not merely on its ruins. All biological, intellectual, social advance has been made in this way. Utter ruin ends in extinction, and not progress."

Dr. Conklin points to a biological analogy in support of his contention. Sudden large changes are sometimes seen to occur in new generations, in the course of evolutionary development. Changes of this type are known as mutations. Scientists who have observed the occurrence of thousands of mutations know that very few of them can pass the test of natural selection. Early death is the fate of almost all mutating organisms.

"Nowhere in the living world is progress brought about by shattering things to bits," Dr. Conklin observes, "but

rather by relatively minor changes in organization. Only when changes are viable and beneficial can there be 'evolution through revolution.'"

Specifically for the United States, Dr. Conklin foresees a post-war set-up in which the traditional rugged individualism of the space-free pioneers will of necessity become adjusted to the requirements for mutual accommodation inherent in a more closely packed society.

"He would be blind indeed who could not see that at present all social tendencies throughout the world are in the direction of greater consideration for the group and less for the single individual," he points out. "This protection of the many from exploitation by a few is bound to go further in the future. It will surely increase opportunities for the 'common man' and lead to a more just and vital democracy."

Science News Letter, December 4, 1943

ENGINEERING

Puffs of Powder Make Whistle Signals Visible

► **ONE** of the best known of American inventors, John Hays Hammond, Jr., is back for another patent, this time on a system for supplementing the sound signals of an air whistle with corresponding visual signals.

Ships' captains used to working with steam, he points out, often depend on watching the white puffs from a whistle rather than on hearing the blasts, especially when the confused noises of many craft in a harbor make the sound of any one whistle difficult to distinguish. To such men the "invisible" blasts from the air whistle customary on diesel-propelled vessels are most unsatisfactory.

Mr. Hammond simply adds a tight cylinder containing a light, fluffy pow-

Don't Delay

getting that **new book** you want to read. SCIENCE NEWS LETTER will gladly obtain for you any American book or magazine in print. Send check or money order covering regular retail price (\$5 if price is unknown, change to be returned) and we will pay postage in the United States. When publications are free, send 10c for handling. Address:

Book Department

SCIENCE NEWS LETTER

1719 N St., N.W. Washington 6, D. C.

der, and provides a supplementary blast of air to puff a cloud of this through a nozzle above the air whistle whenever the latter is sounded. Patent No. 2,334,552 has been issued on this invention.

Science News Letter, December 4, 1943

INVENTION

New Spray Gun Can Handle Two Fluids At Same Time

► **A DOUBLE-BARRELED** spray gun that can handle two stains, dyes or other fluids at the same time is presented by M. E. Hansen of Silver Lake, Ohio, for patent No. 2,335,116, assigned to American Anode, Inc. It was devised primarily to shorten the process of applying the colors to two-toned shoes, but can be adapted for other uses.

Science News Letter, December 4, 1943

The Michigan *crayfish*, a pre-war bait or bathing beach pest, now is used as food.

PREPARE NOW for
POST-WAR
OPPORTUNITIES
with LINGUAPHONE

In your own home you can now prepare for peace-time opportunities in many fields by learning to speak in an amazingly short time any of 29 languages by the world-famous

LINGUAPHONE Ear-Eye METHOD

It's quick, easy, correct

SPANISH	JAPANESE	RUSSIAN
PORTUGUESE	FRENCH	GERMAN
ITALIAN	CHINESE	NORWEGIAN

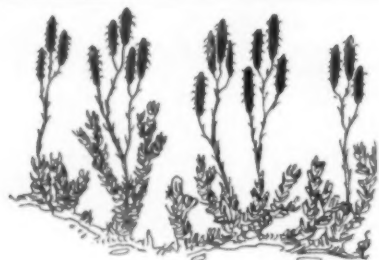
and 20 others.

Successfully used by Army, Navy, Flying and Signal Corps and other services; in thousands of schools and colleges; endorsed by leading educators.

Send for FREE Book—
Call for FREE Demonstration

LINGUAPHONE INSTITUTE

31 RCA Bldg., Rockefeller Plaza, N. Y. (20)



Anti-Christmas Greens

► CHRISTMAS wreaths and garlands, already appearing in the market, will probably find even readier sale than usual this year because of the sharply reduced numbers of Christmas trees available. This sets all the greater value on discrimination and judgment in purchasing, lest you unwittingly make yourself party to a violation of the very spirit of the season of good will.

Some kinds of Yuletide garlands and greeneries, gathered in the wild, can be marketed only at the expense of sound conservation principles. All too often, also, they represent outright and deliberate theft on the part of the gatherers. They are, in truth, black market operations of the worst kind, conducted brazenly and openly in the daylight, either because there is no specific statute prohibiting them or because general laws are not considered worth enforcing in their case.

Perhaps the most notable of these offenses is involved in the commercial exploitation of ground pine. This plant, sometimes loosely thought of as a kind of moss, is really more closely related to the ferns. It grows abundantly in

certain types of woodland, especially on the thin, loose-textured, acid soils common in second-growth pine forests, where it often affords the only ground cover protecting against soil erosion. Since the type of forest with which it is associated in itself generally represents an effort toward restoration after disaster or abuse, any action on our part that causes even a slight additional setback is simply piling injury upon injury.

Less grievous in direct consequences, though even more deplorable in terms of loss of beauty to the woods, is the large-scale marketing of native American holly. Like the ground pine, this is usually obtained without the knowledge and consent of the owners of the land, so that it is as a rule hacked from the trees in haste and with utter recklessness as to their subsequent fate. No patriotic American will buy American holly. He will buy English holly instead if he can find it; for this glossier, brighter-berried species is now raised for the market in this country, and its purchase puts American dollars into the pockets of honest growers instead of thieves.

Not all wild gathered holiday greens need be avoided, however. The "synthetic" holly-like decorations made by combining twigs of mountain laurel with the red berries of swamp ilex, most conservationists agree, are quite permissible because their wild sources are extremely abundant and because harvesting methods commonly used only cut off the ends of branches, leaving the plants essentially unharmed.

Science News Letter, December 4, 1943

NUTRITION

Malnutrition Death Rate Cut From Over 50% to 0

► THE DEATH RATE in persons gravely ill from deficiency diseases, the hidden hunger sicknesses that result from faulty diet, has been cut from over 50% to zero, Dr. Tom D. Spies, of the University of Cincinnati and Hillman Hospital, Birmingham, Ala., told members of the Southern Medical Association meeting in Cincinnati.

In the nutrition clinic, a cooperative of the hospital and the university, 95% of the vitamin B complex deficiencies are among the white persons, Dr. Spies reported, and 95% of the rickets cases are in Negroes.

"Throughout history," he declared, "war, famine and death have been associated. Now, more than ever before, it is important to apply what we know about nutrition in order to prevent ill-

ness and death from undernourishment."

Poverty alone is not the cause of poor diet and deficiency diseases, he stated. They affect both rich and poor if they have not eaten the proper food. Lack of knowledge as well as lack of money may lead to poor diet and resulting disease. Even with a good diet, deficiency diseases may occur if there is some other condition which prevents the body from properly using the food that is eaten.

Saving patients who were dying of pellagra, beriberi or scurvy would have satisfied physicians a few years ago, but today, Dr. Spies pointed out, interest centers in early diagnosis and treatment of mild states of vitamin hunger in order to get the patient back to health and work as quickly as possible.

Science News Letter, December 4, 1943

NUTRITION

Don't Be Wishful Thinker About Powers of Vitamins

► DON'T be a wishful thinker about vitamins, or about anything else, for that matter. A good many otherwise sensible grown men and women who know they cannot have a castle in Spain by merely dreaming about it seem nevertheless to believe they can gain eternal youth and strength, freedom from colds and every other ill, by simply taking vitamins.

The warning against this wishful thinking on the vitamin subject comes from Dr. A. J. Carlson, professor emeritus of physiology at the University of Chicago. At the wartime nutrition conference of the Institute of Medicine of Chicago, he stated that wishful thinking on the vitamin problem by scientists as well as laymen "may promote malnutrition by baseless faith and false hopes that the 1943 variety of synthetic vitamin pills will make up for every variety of food deficiencies there may be present or may threaten our people."

Vitamins, as almost everyone well knows, are remarkably potent chemicals. They are absolutely essential for that normal functioning of the body which we recognize as good health. Without enough of the vitamins, people get sick. Dr. Carlson's point, however, is that people also get sick when they are not getting enough of various other chemicals found in foods. Some of these chemicals are known; the amino acids, for example, which are building blocks for the protein in flesh and blood and various body organs.

Other chemicals are also found in

DICTIONARY OF MATHEMATICAL TERMS AND PHRASES

Saves time and worry. Almost indispensable in the home, library and office. A meaningful and attractive Christmas gift, gold lettered and fabrikoid binding.

THE JAMES MATHEMATICAL DICTIONARY,

only such book now published, includes the technical terms ordinarily used in applications; easy examples; illustrations; tables ordinarily used in handbooks, and extensive tables of weights and measures.

From Professional Engineer: "... perhaps the best book that has been made available to those interested in mathematics for many a day".

From Chemical and Engineering News: "... the simpler and basic concepts are all present, plus interesting facts about numbers and systems".

Indicate flexible or non-flexible binding. Price \$3.00 from The Digest Press, Dept. 38, Van Nuys, California, or Science News Letter.

Gift books specially wrapped and mailed as you instruct.

natural foods. The need for some of them is known. The need for others of them, or their very existence, may not be known. If we rely on a wide variety of natural foods to nourish our bodies, we will be getting the vitamins, amino acids and all the other chemicals, known and unknown, which we need. If we limit our eating to only a few foods, and those refined or otherwise processed

so as to remove some of the chemicals they originally contained, we are likely to be denying ourselves some chemicals we need. Since some of them may be unknown, we cannot make up the deficiency merely by taking pills of the chemicals we know we are not getting in diets made of a limited variety of foods.

Science News Letter, December 4, 1943

Books of the Week

➤ **GREAT CULTURES** have arisen and grown old and died many times on the earth; curiously, the earliest and oldest of them, Egypt, is the one that has most successfully offered defiance to death. Its temples, though in ruins, and the images of its kings, though mutilated, are still able to tell to the discerning eye of the ancient land's many centuries of ordered energy, acute knowledge, and the passionate feeling for justice that expresses itself even in the right proportions of carved stones. Photographs that have caught these meanings, taken by Hoyningen-Huene, fill an approximate third of the pages of a splendid new book called, simply, **EGYPT**; the text, by George Steindorff, gives a condensed though not skimmed account of the long history from pre-dynastic times to the present day. For a really fine Christmas present it would be hard to find a book more suitable—the more so since all royalties are donated for Greek war relief. (*Augustin*, \$7.50)

Science News Letter, December 4, 1943

➤ **WEATHER**, which used to be merely something to talk about, has with the advent of aviation become literally a matter of life and death. Everybody nowadays wants to be able, at least to some extent, to read the clouds and sense the meaning of the winds. In **KNOWING THE WEATHER**, T. Morris Longstreth provides an easy, chatty, not-too-technical account of the principal weather phenomena and their underlying factors for those of us who don't want to wade through formal textbook presentation. (*Macmillan*, \$1.69)

Science News Letter, December 4, 1943

➤ **LEADERS** always interest us; leaders in war have an intensified appeal, especially now. **THESE ARE THE GENERALS** is a group of vivid pen-pictures of the outstanding American army leaders by a dozen different writers which appeared originally as separate articles in three weekly magazines. It is a decided convenience to have them all gathered between two covers. (*Knopf*, \$2.50)

Science News Letter, December 4, 1943

Just Off the Press

ARE YOU ALLERGIC—Jessamine Hilliard and Charles C. Coghlan—*Barrows*, 248 p., \$2.50.

THE CALENDAR FOR EVERYBODY—Elisabeth Achelis—*Putnam* 141 p., \$1.50.

COME OVER INTO MACEDONIA: The Story of a Ten-Year Adventure in Uplifting A War-Torn People—Harold B. Allen—*Rutgers*, 313 p., illus., \$3.

CONDITION RED: Destroyer Action in the South Pacific—Frederick J. Bell—*Longmans, Green*, 290 p., illus., \$3.

THE DANUBE BASIN AND THE GERMAN ECONOMIC SPHERE—Antonin Basch—*Columbia Univ.*, 275 p., \$3.50.

EGYPT—Dr. George Steindorff—*J. J. Augustin*—180 p., illus., \$7.50.

THE GREAT AMERICAN CUSTOMER: The Story of Invention, Mass-Production and of Our Prosperity—Carl Crow—*Harper*, 251 p., illus., \$3.

HANDBOOK OF SALAMANDERS—Sherman C. Bishop—*Comstock*, 555 p., illus., \$5.

HANDBOOK OF TABULAR PRESENTATION: How To Design and Edit Statistical Tables—Ray Ovid Hall—*Ronald*, 112 p., illus., \$3.50. This will be a great aid to all who have to line up figures for publication in smart and useful columns and are troubled about the form and style.

HOW TO USE EMPLOYMENT TESTS—Floyd Ruch—*California Test Bureau*, 16 p., \$1., paper.

JAMES OLIVER CURWOOD: Disciple of the Wilds—H. D. Swiggett—*Paebur*, 192 p., illus., \$3.50.

MANUAL OF COMPARATIVE ANATOMY—Osmond P. Breland—*McGraw-Hill*, 250 p., \$2. A laboratory manual for the college level covering the anatomy of the standard animals used: amphioxus, lamprey, dogfish, perch, necturus, turtle and cat. The

guide has been prepared so that the individual would be able to find the designated structures with a minimum of outside assistance.

O'HENRY MEMORIAL AWARD PRIZE STORIES OF 1943—Herschel Brickell, ed.—*Double-day, Doran*, 319 p., \$2.50. Selected stories of the year chosen from hundreds of magazines for this 25th anniversary volume of the O'Henry Memorial Award.

POSTWAR PLANS OF THE UNITED NATIONS—Lewis L. Lorwin—*Twentieth Century Fund*, 307 p., \$2.50.

THIS FASCINATING LUMBER BUSINESS—Stanley F. Horn—*Bobbs-Merrill*, 328 p., illus., \$3.75.

THOSE WERE THE DAYS: Tales of a Long Life—Edward Ringwood Hewitt—*Duell, Sloan & Pearce*, 318 p., \$3. Mr. Hewitt tells about Peter Cooper, his grandfather and founder of Cooper Union; Sir Hiram Maxim; the first J. P. Morgan; Buffalo Bill; Andrew Carnegie, and the early days of the automobile and airplane in addition to his inventions with his brother Cooper Hewitt.

WHO ARE THE AMERICANS?—George Allen Kennedy—*Paebur*, 176 p., \$1.25.

WHY THE UNIVERSE? Or, Cosmopoietic Space—Percy A. Campbell—*George Fields*, 189 p., \$2.50.

STEP UP YOUR EARNING POWER!

know **CHEMISTRY**

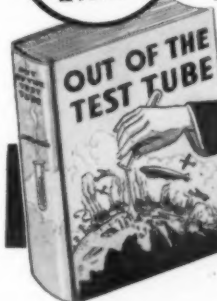
102 Pictures—Easy to Understand

THE MODERN BOOK EVERYONE NEEDS! For executives, plant assistants, war workers and students. Presents whole subject of chemistry. Your health, your home, your food, your car, yes even your job is affected by the many modern advances in Chemistry. Helps you understand your job and make your life more profitable. Over 300 large pages. Over 100 explanatory illustrations. **OUT OF THE TEST TUBE** is written by the famous chemist, Dr. Harry N. Holmes, Prof. of Chemistry, Oberlin College, 1942 President of American Chemical Society.

Highly Endorsed, Practical Information

Prominent editors everywhere recommend this book as required reading for those who want to improve their earning ability with chemistry. Answers your questions. A background in chemistry can give you a backlog in earning power.

VITAL & IMPORTANT FACTS ABOUT YOUR LIFE & FUTURE



Examine Free—No Obligation

Send no money. Mail the coupon today for 7 Days Free Trial.

READ FREE then Decide!

Mail this coupon to your bookseller or **EMERSON BOOKS, Inc.**, Dept. 350-C, 251 West 19 St., New York 11, N. Y. Send

copy of "Out of the Test Tube". I will pay only \$3 (plus few cents postage). I must be satisfied or will return book in 7 days for refund.

Name _____ (Please Print)

Address _____
☐ Check if you enclose \$3, thus saving delivery charges. (Same money-back guarantee)

• New Machines and Gadgets •

❁ **CONCEALED** headlights on automobiles may become common after the war. A device, just patented, permits a driver to operate from the dashboard shutters which mask and unmask the headlights.

Science News Letter, December 4, 1943

❁ **BOMB-SHAPED** boxes of wood have been successfully used to drop equipment from airplanes without using parachutes. The contents, sometimes including delicate instruments, are packed deep in excelsior. Boxes weighing from 100 to 200 pounds when filled, dropped 2,000 feet from planes moving 200 miles an hour, delivered their contents with an average breakage of only 0.5%.

Science News Letter, December 4, 1943

❁ **PEDESTRIAN** safety in darkness is assisted by two buttons on the back and two on the breast, worn suspended by straps over the shoulders. A reflecting button warns automobile drivers and a luminous button warns others of the wearer's approach. The device has been patented.

Science News Letter, December 4, 1943



❁ **SAFETY** devices, not jam tarts, are being prepared by the girls in the accompanying photograph. They are painting devices that protect airport lights and other equipment against short circuits. The tiny disks are glued to both sides of asbestos washers. An over-charge

of electricity fuses them into one and the charge is conducted out of the circuit before it causes damage.

Science News Letter, December 4, 1943

❁ **AN ELECTRIC** razor with a removable conical head, which rolls instead of sliding over the face when shaving, has been recently patented. Perforations in the head permit the ends of the hairs to enter where they are cut off by moving blades.

Science News Letter, December 4, 1943

❁ **JAM-RIVETING** is the term applied to riveting with a new hand tool which has a hinged yoke held behind the rivet. The vibrator, or hammer, is operated by compressed air or other power as in ordinary riveting hammers. One model has an adjustable depth timer.

Science News Letter, December 4, 1943

❁ **FLOORS** may be made impervious to acid, water, oil and grease by use of a new floor preparation. The material can be applied to new floors as an overlay on concrete, brick, wood or stone. Or it can be used on existing floors to repair and resurface areas needing attention. Floors thus treated are claimed to be durable and smooth.

Science News Letter, December 4, 1943

Question Box

AERONAUTICS

What are veteran Army airplanes being used for? p. 365.

AGRICULTURE

Why are crop losses due to heavy rains unnecessary? p. 360.

ARCHITECTURE

How will the plumbing and wiring of future homes probably be different from those of today? p. 369.

ASTRONOMY

What woman astronomer was given a prize? p. 361.

CHEMISTRY

What will replace scarce porpoise jaw oil? p. 361.

CONSERVATION

What are anti-Christmas greens? p. 366.
What has the lack of sufficient fuel brought about in Great Britain? p. 357.

ENGINEERING

How can whistle signals be made visible? p. 365.
What machine will probably use high octane gas after the war? p. 361.
Which is the most electrical U. S. battleship? p. 359.

EVOLUTION-SOCIOLOGY

Why shouldn't we try to force the process of change as civilization progresses? p. 365.

MEDICINE

How can aluminum help silicosis patients? p. 358.

How is molasses speeding penicillin production? p. 362.

What are the results of a year's use of the two fast treatments of syphilis? p. 356.

What bronchial disease has sulfadiazine been found to help? p. 361.

What is the story behind the home-production method of making penicillin? p. 364.

Who is the "human guinea pig" that received a medal? p. 360.

NUTRITION

What is the death rate of persons with malnutrition diseases? p. 366.

What makes a good cottage cheese substitute? p. 360.

Why do soldiers need lots of vitamin C? p. 358.

OPTICS

What new device is designed to aid football officials? p. 361.

What visual illusion is caused by the double role of the eye muscles? p. 360.

PHOTOGRAPHY

How can aerial photographs be located exactly? p. 355.

PHYSICS

How does a newly developed microscope give an image in full color? p. 355.

How have X-ray tests of the smallest quantum of energy been reconciled with theory? p. 356.

Where published sources are used they are cited.

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, 1719 N St., N. W., Washington 6, D. C., and ask for Gadget Bulletin 185.

Send that soldier, sailor or marine overseas the monthly OVERSEAS edition of the SCIENCE NEWS LETTER. Mailed as a letter each month, this gift costs only \$1.25 for a year's subscription.

The imprint to the right is mailing address for your Science News Letter.

Date on lower line is expiration of your subscription.

Renew early to avoid lapse in service.

In requesting change of address please give your old address as well as the new one, at least two weeks before change is to become effective.